The 8th Global-COE International Frontier Seminar

May 14th, 2009, from 17:00, at the room# 486 meeting room 4F

Experimental constraints on the chemistry and physical state of the terrestrial planetary cores

Prof. Yingwei Fei

Geophysical Laboratory, Carnegie Institution of Washington, USA

Past and current space missions to Mars have provided important constraints on the planet's internal density distribution, magnetic field, and physical state of the core. Current mission to Mercury will provide new information about Mercury including interior structure and magnetic field. However, the thermal structures of the interiors of these terrestrial planets remain highly uncertain. Although theoretical calculations may provide some basic knowledge of the thermal evolution of planets, the results from these computer simulations are strongly dependent on the model parameters. Estimating core temperature is difficult because of the uncertainty in the chemical composition and physical state of the core. Knowledge of the physical state of the core is critical for placing bounds on core temperatures. Several lines of geophysical observations may shine some light on the physical state of the core. These observations include the history of magnetic field, solar tidal deformation from spacecraft radio tracking, radar speckle patters tied to the rotation of planet. Additional constraints come from cosmochemical data, thermal history modeling, and experimental simulations in the laboratory at high pressure and temperature. In this talk, I will review our current understanding of the cores of the terrestrial planets from space missions, geophysical observations, cosmochemical constraints, and thermal history modeling. I will then present experimental results on element partitioning and melting relations relevant to the core formation and place constraints on the chemistry and physical state of the core of the terrestrial planets. It will be argued that liquid core may be a common phenomenon for the terrestrial planets.

14 May 2009 17:00-18:00
Room 486, meeting room 4F
GRC building
Ehime University

EHIME UNIVERSITY
GRC
GEODYNAMICS RESEARCH CENTER

Contact: T. Irifune
irifune@dpc.ehime-u.ac.jp
http://www.ehime-u.ac.jp/~grc